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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

NCR Corporation Docket No. 8243.00

Assistant Commissioner for Patents
Washington, D.C. 20231

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Sir:

Transmitted herewith for filing is the patent application of Inventor(s):

John G. Savage, Jonathan S. Black, and Kenneth A. Nicoll

For: **SELF-SERVICE TERMINAL**

Enclosed are also:

- ☒ 2 Sheet(s) of Drawings
☐ An assignment of the invention to NCR Corporation
☐ A certified copy of an application

CLAIMS AS FILED

FOR	Number Filed		Number Extra		Rate		Basic Fee (\$760)
Total Claims	35	-20 =	15	X	\$ 18	=	\$ 270
Independent Claims	6	-3 =	3	X	\$ 78	=	\$ 234
Multiple Dependent Claims	0			X	\$260	=	\$ 0
Total Filing Fee							= \$ 1,264

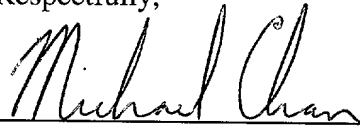
- ☒ Please charge the above filing fee to the account of NCR Corporation, Deposit Account No. 14-0225.

Please have all communications concerning this application and the recorded Assignment directed to:

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Our telephone number is: 937-445-4956

Respectfully,


Attorney for: **John G. Savage et al.**

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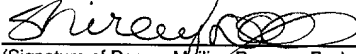
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APPLICATION FOR LETTERS PATENT OF THE UNITED STATES

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SPECIFICATION

To all whom it may concern:

Be It Known, That we, **John G. Savage, Jonathan S. Black, and Kenneth A. Nicoll**, of Fife, Scotland, Dundee, Scotland and Dundee, Scotland, respectively, have invented certain new and useful improvements in **SELF-SERVICE TERMINAL**, of which we declare the following to be a full, clear and exact description:

SELF-SERVICE TERMINAL

Background of the Invention

5 This invention relates to a self-service terminal (SST), such as an automated teller machine (ATM). In particular, the present invention relates to an SST which facilitates communication with a user.

10 A conventional self-service terminal (SST), such as an automated teller machine (ATM), comprises a user keypad for, among other things, selecting menu options, inputting personal identification number (PINs) and the like, and a screen for displaying information to be read by the user, such as instructions and prompts. SSTs used to carry-out security sensitive operations, such as an ATM utilized in the withdrawal of funds from a bank account, may also incorporate means for assisting in identifying a user, or verifying the identity of a user, such as a card reader, accessed via a card reader slot.

15 While such conventional machines may be used without difficulty by many people, there is a significant proportion of the population who will experience difficulties interacting with such machines. In particular, user instructions and prompts are displayed on a relatively small CRT or LCD display, and thus persons with reading difficulties or any visual impairment may find it difficult if not impossible to operate a machine. For example, a person who is "long-sighted", and who does not have vision-correcting eyeglasses in their possession, may have difficulty reading instructions and prompts from such a display.

Summary of the Invention

It is among the objectives of embodiments of the present invention to obviate or mitigate this disadvantage.

25 According to the present invention there is provided a self-service terminal (SST) comprising:

instructing means for producing audible terminal operating instructions for the user;
interface means for permitting the user to interact with the terminal in response to said instructions; and

means for processing user interactions with the terminal.

According to another aspect of the present invention there is provided a method of operating a self-service terminal (SST), the method comprising:

producing audible device operating instructions for a terminal user;

5 permitting the user to interact with the terminal in response to said instructions; and
processing user interactions with the terminal.

As used herein, the term "device operating instructions" is intended to encompass terminal outputs such as prompts and information relating to a transaction or operation to be carried out on the SST, and also information or other matter not directly relevant to a current
10 transaction or operation, such as information on other services provided by the device operator, for example information on services provided by a financial institution, or an invitation to arrange a meeting with an advisor.

In a preferred embodiment the present invention permits a self-service terminal to communicate with a user through natural speech or other sounds, and thus obviates the
15 difficulties associated with the user having to read device operating instructions or prompts from a small screen or other display.

Preferably, the terminal further comprises means for recognizing natural speech, such that the user may interact with the terminal using spoken instructions and prompts. This permits the user and terminal to converse: the terminal will issue instructions in natural
20 speech; the user will provide a spoken response; and the terminal will process and react to the user response. The instructions issued may be tailored to provoke a number of predetermined responses, for example "yes" or "no", and the processing means may be tailored to expect and respond appropriately to a selected one of the anticipated responses.

Preferably also, the instructing means is capable of producing a selected one of a
25 plurality of voices during a transaction or operation, for example a female voice and a male voice. The voice produced by the terminal may be pre-selected by the user, or be pre-selected depending on the age or sex of the user, for example the terminal may issue instructions with a young person's voice when it has been ascertained that a young person is using the machine. In addition, the instructing means may be capable of issuing instructions in a local accent or

dialect, and where the terminal includes speech recognition means, such means may be capable of receiving and understanding instructions in a local accent or dialect: for example, in some parts of the United Kingdom, many people will use the word "Aye", rather than "Yes", and numbers, as may make up a personal identification number (PIN) or a sum of funds to be withdrawn from an ATM, are often pronounced differently in different geographical areas.

The terminal may further comprise means for identifying the user or verifying the identity of the user. Such means may include a card reader or a biometric sensor, and the user may also have to verify their identity by inputting a personal identification number (PIN) or code word.

The terminal may further comprise means for sensing that a user wishes to use the terminal, such as a proximity sensor which identifies that a user has approached the terminal, and on sensing the presence of the user the instructing means may issue an initial instruction, prompt or greeting and the user interaction means be prepared to receive one of a number of anticipated user inputs or responses, or to initiate a user identification or identity verification process. In the absence of an appropriate user input within a predetermined time interval, the terminal may return to a "waiting" mode, ready to greet the next user.

Brief Description of the Drawings

These and other aspects of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic representation of an SST in accordance with one embodiment of the present invention, in the form of an ATM; and

Figure 2 is a block diagram representation of the terminal of Figure 2.

Detailed Description

Reference is first made to Figure 1 of the drawings, which illustrates an SST in accordance with one embodiment of the present invention in the form of an ATM 10. In this example, the ATM 10 includes many of the features of a conventional ATM, namely an

interface means in the form of a user panel 12 including a card reader slot 14 (which is shown having means for identifying the user in the form of an identification card 15 partially inserted therein), a key pad 16 for entering the user's personal identification number (PIN) and transaction details, a cash dispenser slot 18 through which bank notes are dispensed to a user, a display screen 20 for providing information to the user, additional keys 21 disposed at opposite sides of the screen 20 for enabling the user to select preset functions displayed on the screen 20 and aligned with the additional keys 21, and a receipt printer slot 22 through which a receipt for a transaction may be delivered to a user at the end of a transaction.

In addition, the ATM 10 of the present invention includes a loudspeaker 30 and a microphone 32, which allow the ATM 10 and the user to communicate primarily or solely using natural speech, as described below.

Reference is now also made to Figure 2 of the drawings, which is a block diagram of the ATM 10 of Figure 1. Figure 2 shows a user interface module block 40 including the loudspeaker 30, a speech generation module 31, the microphone 32 and a speech processing and recognition module 33. The block 40 also includes the other elements found in a conventional ATM user interface, that is a card reader module 42, the key pad 16, the display 20, and a receipt printer module 44. The card reader module 42 and the receipt printer module 44 are associated with the respective slots 14 and 22 of the user panel 12 of the ATM 10. Figure 2 also shows a cash dispenser module 46 which is associated with the cash dispenser slot 18.

The ATM 10 further comprises processor means in the form of a controller unit 50 which communicates with components of the user interface module block 40, with an operator panel 52 mounted inside to ATM 10, and with the cash dispenser module 46.

The operator panel 52 contains circuitry for enabling an authorized operator to interact with the ATM 10. Standard operator panels 52 are used on a commercially available ATMs and are well known in the art. Similarly, the cash dispenser module 46 will not be described herein as it is a standard feature of a conventional ATM.

The controller unit 50 includes a processor unit 54 and a non-volatile memory 56. The processor unit 54 and memory 56 may be implemented by a micro-computer having non-

volatile RAM; suitable computers and memories are readily available commercially.

In use, the user inserts their card 15 into the card reader slot, and identification data encoded on the card (typically in a magnetic strip located on one side of the card) is read by the card reader module 42. By doing this the user is claiming an identity. For using this example of an ATM 10, the user will have previously identified a preference for the manner in which the user communicates with ATMs 10: in the conventional manner via the screen display 20 and the keypad 16 and keys 21; or, where available, by natural speech via the loudspeaker 30 and microphone 32. In the latter case, the user is requested, by appropriate actuation of the speech generation module 31 and loudspeaker 30, to state their identification number (PIN) or a code word to verify the claimed identity, that is to verify that the person in possession of the card 15 is the authorized card owner. The user then speaks into the microphone 32, the speech recognition module 33 processing the speech sounds. If the user's identity is verified by recitation of the correct PIN or code word, the user is permitted to access the facilities provided by the ATM 10 and a menu of the various transactions available to the user is described via the loudspeaker 30: the speech generation module 31 may be controlled to run through a sequence of options and to prompt a particular response if a particular option is to be selected, for example:

ATM: "If you wish to withdraw cash, please say "one" into the microphone; or
if you wish to hear your account balance; please say "two"."

User: "One".

This "conversation" continues until the transaction has been completed, or is interrupted.

It will be apparent to those of skill in the art that the ATM 10 described above may be utilized without difficulty by users with reading difficulties and users who are visually impaired. Further, it is anticipated that many other users would prefer to converse with a terminal, particularly as the voice generation module 31 may be configured to issue instructions in a particular voice, accent or dialect: for example, the ATM 10 may converse with a user with a woman's voice, with a local accent and in local dialect. Other users may choose other voices, or the voice may be selected by the ATM operator: a user whose

account is overdrawn may be advised, in a stern male voice, to immediately contact the relevant financial institution. Also, the voice may be varied during a transaction, for example one voice may be used to issue instructions and prompts, and another voice used to describe other services not related to the transaction in progress.

5 Similarly, the speech recognition module 33 may be configured to expect instructions and prompts from the user in different voices, accents and dialects.

Users may be reluctant to converse with a terminal within earshot of others, particularly where security sensitive information, such as a PIN or code word, is being relayed to the terminal. Accordingly, terminals in accordance with the invention may be
10 enclosed, partially enclosed, or otherwise arranged to minimize the possibility of the conversation between the terminal and the user from being overheard by third parties. Alternatively, or in addition, the terminal may be provided with sensors for determining the location of the user, and directional loudspeakers and microphones, such that the speech volume may be kept at a relatively low level, and to assist in eliminating background noise.

15 To obviate the requirement for the user to state an identification number (PIN) or the like, terminals in accordance with the invention may utilize biometric sensing means for identifying or verifying the identity of the user. Such biometric sensing means are known and may use one or more of a variety of biometric patterns, including iris patterns, fingerprints, palm prints, voice patterns, finger geometry, or other physical traits or characteristics.

20 The embodiment described above incorporates many of the features of a conventional ATM, however it is of course possible to provide a terminal in accordance with the invention which may omit, for example, the keypad 16, display screen 20 and keys 21, with a corresponding saving in costs, and providing greater flexibility in the design and configuration of the terminal.

25 In other embodiments, the SST may take a different form from that illustrated and described, for example a kiosk for issuing flight tickets.

What is Claimed is:

1. A self-service terminal comprising:
 - instructing means for producing audible terminal operating instructions for a user;
 - interface means for permitting a user to interact with the terminal in response
 - 5 to the audible terminal operating instructions; and
 - means for processing user interactions with the terminal.
2. A self-service terminal according to claim 1, wherein the instructing means issues device operating instructions in natural speech.
3. A self-service terminal according to claim 1, further comprising means for recognizing speech, such that a user may interact with the terminal using spoken instructions and prompts.
4. A self-service terminal according to claim 1, wherein the instructing means produces a selected one of a plurality of available voices during a transaction or operation.
5. A self-service terminal according to claim 1, further comprising means for one of identifying a user and verifying identity of a user.
6. A method of operating a self-service terminal, the method comprising the steps of:
 - (a) producing audible terminal operating instructions for a user;
 - (b) permitting a user to interact with the terminal in response to the
 - 5 instructions produced in step (a); and
 - (c) processing user interactions with the terminal.

- 5

15. An ATM according to claim 11, further comprising means for verifying identity of the ATM customer.

16. An ATM according to claim 15, wherein the means for verifying identity of the ATM customer includes a card reader for receiving a customer identifying card from the ATM customer.

17. A method of operating an automated teller machine (ATM), the method comprising the steps of:

(a) producing audible instructions for an ATM customer to carry out a financial transaction; and

(b) processing inputs from the ATM customer to carry out the financial transaction.

18. A method according to claim 17, wherein the audible instructions comprise natural speech.

19. A method according to claim 17, wherein step (b) includes the step of:

(b-1) recognizing speech by the ATM customer to allow the ATM customer carry out the financial transaction using spoken instructions and prompts.

20. A method according to claim 17, wherein the audible instructions are tailored to provoke one of a number of predetermined responses.

21. A method according to claim 17, wherein step (a) includes the step of:

(a-1) producing audible instructions in a selected one of a plurality of available voices.

22. An automated teller machine (ATM) for allowing an ATM customer to carry out a financial transaction, the ATM comprising:

a speech processing unit for processing speech from the ATM customer and providing output signals indicative thereof; and

5 a processor for controlling operation of the ATM based upon the output signals from the speech processing unit.

23. An ATM according to claim 22, wherein the speech processing unit includes a microphone for (i) receiving speech by the ATM customer to allow the ATM customer carry out the financial transaction using spoken instructions and prompts, and (ii) providing output signals indicative thereof.

5

24. An ATM according to claim 23, wherein the speech processing unit includes a recognition unit for processing the output signals from the microphone to recognize speech by the ATM customer.

25. An ATM according to claim 22, further comprising a generating unit for providing audible instructions for the ATM customer to carry out the financial transaction.

26. An ATM according to claim 25, wherein the generating unit produces ATM operating instructions in natural speech.

27. An ATM according to claim 25, wherein the generating unit produces audible instructions in a selected one of a plurality of available voices.

28. An ATM according to claim 22, further comprising means for verifying identity of the ATM customer.

29. An ATM according to claim 28, wherein the means for verifying identity of the ATM customer includes a card reader for receiving a customer identifying card from the ATM customer.

30. A method of operating an automated teller machine (ATM), the method comprising the steps of:

- (a) receiving speech from an ATM customer;
- (b) processing speech received from the ATM customer of step (a) and
5 providing output signals indicative thereof; and
- (c) controlling operation of the ATM based upon the output signals of step (b).

31. A method according to claim 30, further comprising the step of:

- (d) providing audible instructions for the ATM customer to carry out the financial transaction.

32. A method according to claim 31, wherein the audible instructions comprise ATM operating instructions in natural speech..

33. A method according to claim 31, wherein step (d) includes the step of:

- (d-1) producing audible instructions in a selected one of a plurality of available voices.

34. A method according to claim 30, further comprising the step of:

- (d) verifying identity of the ATM customer.

35. A method according to claim 33, wherein step (d) includes the step of:

- (d-1) receiving a customer identifying card from the ATM customer to verify identity of the ATM customer.

SELF-SERVICE TERMINAL

Abstract

A self-service terminal, such as an ATM (10), comprises a speech generator (31) and
5 loudspeaker (30) for producing natural language operating instructions for a user, and a user
interface (12) permitting the user to interact with the terminal (10) in response to the spoken
instructions. The user interface may include a microphone (32) and a speech recognition
module (33).

FIG. 1

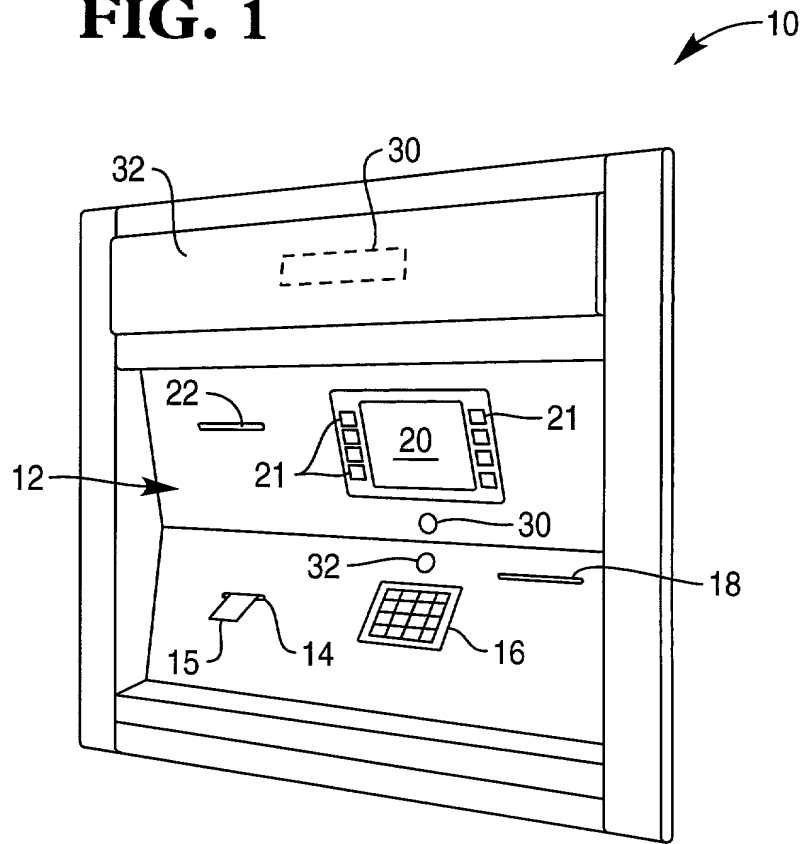
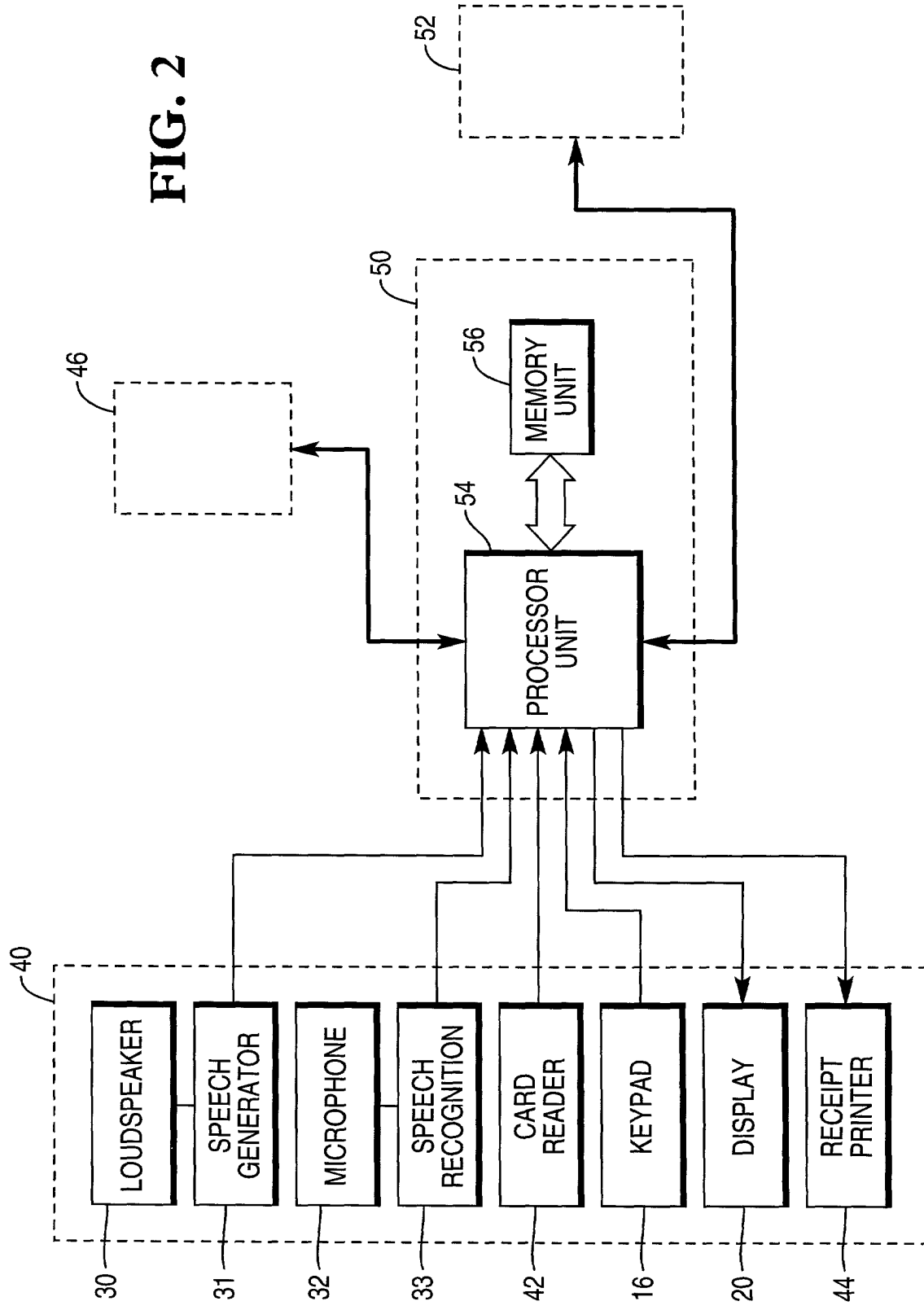


FIG. 2



United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SELF-SERVICE TERMINAL

and identified by NCR Corporation Docket No. 8243.00, the specification of which:

- a. ☒ is attached hereto
- b. ☐ was filed on _____ as United States Application Number or PCT International Application Number _____ and was amended on _____ (if applicable), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT application having a filing date before that of the application on the basis of which priority is claimed:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
United Kingdom	9824762.0	11 November 1998	N/A

OTHER FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)

COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
	None		

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or 365(c) of any PCT international application(s) designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. PARENT APPLICATION OR PCT PARENT NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)
None		

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)
None	

And I hereby appoint: Michael Chan of Dayton, Ohio, Registration No. 33,663,
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my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. I hereby expressly waive my right to revoke the Power of Attorney granted above. Address all telephone calls to Michael Chan at telephone number 937-445-4956.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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